

154213

TO: Mr. Charles J. Walters
Public Health Advisor
ATSDR EPA Region III

FROM: Kevin Koob, EPA Region III On-Scene Coordinator
Eastern Response Section

SUBJECT: Diamond State Salvage Site
Wilmington, New Castle County, DE

DATE: August 16, 1995

I. Identifying Information

Site Name: Diamond State Salvage Site

Site Location: Wilmington, New Castle County, DE

Site Type: Abandoned salvage yard with heavy debris from past operations.

Description of the Problem

Diamond State Salvage operated at the site from 1949 to 1992. During this time, full scale salvage operations consisted of removing salvageable metals from automobiles, appliances, and batteries. Field visits conducted by Delaware Department of Natural Resources and Environmental Control (DNREC) to the site and surrounding areas reveal that extensive contamination of the soils has occurred during the operational history. Much of the property is covered by excavated earth mixed with debris and trash. Results from DNREC soil testing indicate elevated concentrations of lead (i.e. high value = 4360 ppm), polychlorinated biphenyls (PCBs) (i.e. high value = 58 ppm) and polycyclic aromatic hydrocarbon (PAH) (i.e. high value = 21 ppm for benzo-a-pyrene). In June 1995, U.S. EPA OSC Koob tasked the Technical Assistance Team (TAT) to collect samples at the Diamond State Salvage Site. The results from this sampling event revealed high levels of lead and PCBs. There is a potential threat of the lead and PCBs entering the Brandywine Creek through storm water run-off and erosion of the earth bordering the creek.

II. Substances Present

A summary of hazardous substances found at the Diamond State Salvage Site has been attached (See Attachment I, II, & III).

AR000001

Potential Health Threats

See Attachment IV - Material Safety Data Sheets (MSDS).

III. Geographical and Demographical Data

The Diamond State Salvage Site is located in northern New Castle County on 14th Street, between Pine and Church Streets in Wilmington, Delaware. The western border of the site is the Brandywine Creek. The inactive, elongated, triangular-shaped 4.25 acre parcel. The immediate border of the property is a mixture of vacant lots and buildings and industries. Beyond the immediate boundaries are extensive residential areas. All residents are believed to be on public water. Private wells are located two miles from the site.

The Diamond State Salvage area is located upstream from extensive wetlands. These wetlands are along the Brandywine Creek, Christina River and Delaware River.

Surface water from the site flows downgradient and discharges into Brandywine Creek. Tidal, marsh and low marsh wetlands are located along Brandywine Creek and Christina River 500 feet from the site. The Brandywine Creek flows in an approximate south-southeastern direction to the Christina River 1.4 miles from the site. The Christina River flows into the Delaware River 3.2 miles from the site. Both bodies of water are used for recreational fishing.

IV. Relationship to Nearby Community

The site is located in a residential/industrial area of northern New Castle County on 14th Street, between Pine and Church Streets in Wilmington, Delaware. The western side of the property is bordered by Brandywine Creek which encloses the property, as well as three locked gates at the entrances, provide semi-restricted access. The fence and gates are in several areas, allowing enough room for a person to trespass. Approximately 1469 individuals residing within 1/4 mile of the site, educational facilities, an elementary school, a vocational-technical school and daycare center, are located within 250 feet of the site. The population within 1 mile of the site is 28,552. A total of 123,077 people reside within a 4-mile radius of the site.

AR000002

V. Site History

Diamond State Salvage operated at the site from 1949 to 1992. The owner's father acquired the land from a coal and heating oil company in 1949. Diamond State Salvage operated a full scale salvage facility which consisted of removing metal from automobiles, appliances, and batteries. The metals were then shipped to several scrap metal buyers. Some materials, such as rubber and plastics, remained on site. Other materials were transported to the local landfill.

Field visits conducted by DNREC to the site and surrounding areas show that extensive contamination of the soils had occurred during the operational history. There is a reported odor of petroleum and turpentine coming from the soils, as well as a petroleum sheen on the surface water on site.

During 1991 and 1992, operations at Diamond State Salvage consisted mainly of excavating the ground surface of the site to locate any metals with salvage value. As a result of this excavation, over half of the site is covered with piles of earth mixed with large portions of debris and trash. Weathering effects over the past two years have formed deep ditches and pools along the edges of the debris piles.

Results from DNREC soil tests indicate elevated concentrations of lead (i.e. high value = 4360 ppm), polychlorinated biphenyls (PCBs) (i.e. high value = 58 ppm) and polycyclic aromatic hydrocarbons (PAHs) (i.e. high value = 21 ppm for benzo-a-pyrene).

On June 9, 1995, EPA TAT collected one surface water sample and eighteen soil/sediment samples from the areas indicated on the attached sample location map (See Map II). The samples have subsequently been analyzed by a contracted lab and have been reviewed by a TAT QA/QC officer. (See Data Attachments I, II & III).

AR000003

VI. Information on Quality Assurance/Quality Control

Methodology

MATRIX	ANALYSIS	METHOD
SOIL	PP METALS	6010, except As 7060 Sb 7041 Se 7740 Ti 7841 Hg 7471
SOIL	BNA (TCL Semivolatile Organics)/ Pesticides/PCBs	OLM01.8
SURFACE WATER	PP METALS	OLM01.8
SURFACE WATER	BNA/PCB/PEST	OLM01.8

Analytical Review

See Analytical Review (Attachment V).

Sampling Locations

The basis for determining the sample locations was to obtain data needed to determine the extent of the on site and migrating contaminated soils. To accomplish this task, TAT retrieved nineteen surface soil (0-6") and sediment samples and one surface water sample from random points within the site boundaries. These locations were determined by the OSC and are depicted on the attached Site Sampling Map (See Map II).

ATTACHMENTS: Analytical Summary Tables
Material Safety Data Sheets
TAT Analytical Review
Chain of Custody Records
Site Location/Sampling Maps
Site Photographs

AR000004

Attachment 1: Analytical Summary (PCBs)

AR000005

DIAMOND STATE SALVAGE PCB DATA

SAMPLE NO.	AROCLOR-1254 (MG/KG)	ACTION LEVEL (MG/KG)
AQ1	U	
S1	13	50
S2	25	50
S3	U	50
S4	280	50
S5	120	50
S6	170	50
S7	27	50
S8	16	50
S9	110	50
S10	38	50
S11	27	50
S12	36	50
S13	U	50
S14	130	50
S15	56	50
S16	110	50
S17	35	50
S18	140	50
S19	59	50

AR000006

Attachment 2: Analytical Summary (Inorganics)

AR000007

DIAMOND STATE SALVAGE INORGANIC DATA

COMPOUND	AQ1(U/L)	RISK LEVEL	S1	S2	S3	S4	S5	S6	S7	S8	S9	RISK LEVEL
Aluminum	202	15	61600	42700	10300	10900	12900	13200	6660	12700	14600	78000
Antimony	U	15	48.7	87.9	5.58	186	28.3	71.1	88.8	36.8	81.8	31
Arsenic	U	0.038	10.2	11.9	3.6	18.2	15.5	26.9	29.7	12.8	18	23
Barium	89.1B	2600	295	1380	121	969	458	799	819	432	809	5500
Beryllium	U	0.016	1.1B	.86B	.95B	1.2	.84B	1.5	.92B	1.1	1.2	0.15
Cadmium	U	18	44.1	18.4	5.5	29	85.4	37.5	42	8.5	27.8	39
Calcium	24000		36600	26300	19800	32000	12700	20600	26100	88800	32600	
Chromium	U	180	681	160	39.1	279	128	424	426	1070	273	390
Cobalt	U	2200	14.9B	8.7B	7.7B	38.6	20.2	36.2	33.1	15.9	25.2	470
Copper	18.7B	1400	20100	26700	2890	2100	1810	1680	719	2390	2430	2900
Iron	1840	U	59000	82500	16200	78900	96500	16800	133000	2590	132000	
Lead	3.7	U	3830	5430	719	6000	3050	3850	4000	2560	6740	500
Magnesium	7030	U	13200	7790	8510	6710	3390	5480	5610	18400	8870	
Manganese	124	180	1430	883	374	1510	1220	2040	1360	7250	1840	390
Mercury	U	11	4.6	0.57	0.94	37	11.9	17.7	1.8	4.3	31.8	23
Nickel	U	730	365	127	34.6	613	325	445	209	400	350	1600
Potassium	10600		10600B	2530	1610	10800B	1170	995B	1300	930B	1000B	
Selenium	U	180	12.6	1.2	U	U	U	U	U	U	U	390
Silver	U	180	15.2	4.3	1.6B	2.2	1.5B	10.3	2.3	1.6B	7.4	390
Sodium	5780		521B	2260	341B	688B	746B	571B	445B	664B	532B	
Thallium	U		U	U	U	U	U	U	U	U	U	
Vanadium	U	260	49.6	30	27.5	1390	86.9	387	99.3	220	153	550
Zinc	14.7B	1100	2680	4090	873	7820	5030	11200	13300	2630	6900	2300

*SOIL SAMPLES (S#) ARE REPORTED IN MG/KG, AQUEOUS SAMPLES (AQ#) ARE REPORTED IN UG/L

**RISK LEVELS FOR AQ1 ARE BASED ON TAP WATER RISK LEVELS

***RISK LEVELS ARE BASED ON US EPA REGION III ROY L SMITH'S RISK - BASED CONCENTRATION TABLE

AR000008

DIAMOND STATE SALVAGE INORGANIC DATA

COMPOUND	S10	S11	S12	S13	S14	S15	S16	S17	S18	S19	RISK LEVEL
Aluminum	13000	8330	9940	17400	10200	9300	14000	17100	16700	22600	78000
Antimony	35.8	22.8	46.3	23.6	39.4	32.9	55.8	18.1	100	42.7	31
Arsenic	26.9	30	25.9	26.4	18.4	24.4	21.2	16.2	31.6	17	23
Barium	651	945	1110	1920	664	582	853	498	1310	716	5500
Beryllium	1.3	.838	.818	.618	1.3	1.28	1.28	1.18	1.2	.968	0.15
Cadmium	45.1	52.6	37.5	197	30.9	537	82.5	12.2	44.2	29.1	39
Calcium	15000	13500	12000	19700	24900	14600	38900	113999	19300	28300	
Chromium	254	117	125	120	278	275	307	1490	335	244	390
Cobalt	33.8	17.8	16.3	14.5	38.7	28.3	21.8	13.28	46.5	17.5	470
Copper	1530	751	2830	2190	1980	2380	2010	801	2310	6240	2900
Iron	222000	87600	94900	108000	115000	171000	120000	99400	155000	65200	
Lead	2260	3750	3410	2690	3940	3440	4460	1870	8400	6330	500
Magnesium	3870	3090	3530	5840	4910	3410	6870	23000	4670	12600	
Manganese	1370	762	7199	668	3340	1770	1760	9730	1850	1210	390
Mercury	14.5	2	3.3	4.4	11.3	22.7	38.6	5.7	73.9	31.8	23
Nickel	345	210	314	399	234	332	306	131	505	269	1600
Potassium	7358	1200	10108	6338	8638	8108	15708	1600	11208	4210	
Selenium	U	U	U	U	U	U	U	U	U	.868	390
Silver	1.88	.668	.776	.88	6.5	3.3	3.8	1.58	3.6	5.3	390
Sodium	7148	518	4298	U	4078	5158	9028	6498	3708	5568	
Thallium	U	U	U	U	U	U	U	U	U	U	
Vanadium	121	121	84	27.2	213	225	217	292	269	631	550
Zinc	7510	6140	8110	26900	10300	4370	8620	2480	12800	4260	2300

*SOIL SAMPLES (S#) ARE REPORTED IN MG/KG. AQUEOUS SAMPLES (AQ#) ARE REPORTED IN UG/L

**RISK LEVELS FOR AQ1 ARE BASED ON TAP WATER RISK LEVELS

***RISK LEVELS ARE BASED ON US EPA REGION III ROY L. SMITH'S RISK - BASED CONCENTRATION TABLE

AR0000009

Attachment 3: Analytical Summary (Semivolatiles)

AR000010

DIAPYND STATE SALVAGE SEMIVOLAT' - DATA

COMPOUND	AQ1	RISK LEVEL **	S1	S2	S3	S4	S5	S6	S7	S8	S9	RISK LEVEL ***
Phenol	U	22000	U	U	U	U	U	U	U	U	U	47000
bis(2-chloroethyl)ether	U	0.0092	U	U	U	U	U	5.00	U	U	U	0.580
2-Chlorophenol	U	180	U	U	U	U	U	U	U	U	U	390
1,3-Dichlorobenzene	U	540	U	U	U	U	U	U	U	U	U	7000
1,4-Dichlorobenzene	U	0.44	U	U	U	U	U	U	U	U	U	27
1,2-Dichlorobenzene	U	270	U	U	U	U	U	U	U	U	U	7000
2-Methylphenol	U	1800	U	U	U	U	U	U	U	U	U	3900
2,2'-oxybis(1-Chloropropane)	U		U	U	U	U	U	U	U	U	U	3900
4-Methylphenol	U	180	U	U	U	U	U	U	U	U	U	0.091
N-Nitroso-di-n-propylamine	U	0.0068	U	U	U	U	U	U	U	U	U	46
Hexachloroethane	U	0.75	U	U	U	U	U	U	U	U	U	39
Nitrobenze	U	3.4	U	U	U	U	U	U	U	U	U	670
Isophorone	U	71	U	U	U	U	U	U	U	U	U	4800
2-Nitrophenol	U	2300	U	U	U	U	U	U	U	U	U	1600
2,4-Dimethylphenol	U	730	U	U	U	U	U	U	U	U	U	230
bis(2-Chloroethoxy)methane	U		U	U	U	U	U	U	U	U	U	780
2,4-Dichlorophenol	U	110	U	U	U	U	U	U	U	U	U	3100
1,2,4-Trichlorobenzene	U	190	U	U	U	U	U	U	U	U	U	310
Naphthalene	U	1500	U	U	U	U	12.00	7.20	U	U	U	6.2
4-Chloroaniline	U	150	U	U	U	U	U	U	U	U	U	550
Hexachlorobutadiene	U	0.14	U	U	U	U	U	U	U	U	U	58
4-Chloro-3-methylphenol	U		U	U	U	U	U	U	U	U	U	7800
2-Methylnaphthalene	U		U	U	U	U	4.80	4.60	U	U	U	6300
Hexachlorocyclopentadiene	U	0.15	U	U	U	U	U	U	U	U	U	4.7
2,4,6-Trichlorophenol	U	6.10	U	U	U	U	U	U	U	U	U	780000
2,4,5-Trichlorophenol	U	3700	U	U	U	U	U	U	U	U	U	78
2-Chloronaphthalene	U	2900	U	U	U	U	U	U	U	U	U	230
2-Nitroaniline	U	2.2	U	U	U	U	U	U	U	U	U	4700
Dimethylphthalate	U	370000	U	U	U	U	U	U	U	U	U	160
Acenaphthylene	U		U	U	U	U	U	U	U	U	U	310
2,6-Dinitrotoluene	U	37	U	U	U	U	U	U	U	U	U	160
3-Nitroaniline	U	110	U	U	U	U	U	U	U	U	U	
Acenaphthene	U	2200	U	U	U	U	13.00	5.10	U	U	U	3100
2,4-Dinitrophenol	U	73	U	U	U	U	U	U	U	U	U	230
4-Nitrophenol	U	2300	U	U	U	U	U	U	U	U	U	
Dibenzofuran	U	150	U	U	U	U	11.00	4.00	U	U	U	
2,4-Dinitrotoluene	U	73	U	U	U	U	U	U	U	U	U	
Diethylphthalate	U		U	U	U	U	U	U	U	U	U	
4-Chlorophenyl-phenylether	U		U	U	U	U	U	U	U	U	U	
Fluorene	U	1500	U	U	U	U	22.00	6.20	U	U	U	
4-Nitroaniline	U	110	U	U	U	U	U	U	U	U	U	
4,6-Dinitro-2-methylphenol	U		U	U	U	U	U	U	U	U	U	
N-Nitrosodiphenylamine	U	14	U	U	U	U	U	U	U	U	U	
4-Bromophenyl-phenylether	U	2100	U	U	U	U	U	U	U	U	U	
Hexachlorobenzene	U	0.0068	U	U	U	U	U	U	U	U	U	0.004
												4500
												0.400

*SOIL SAMPLES (S#) ARE REPORTED IN MG/KG, AQUEOUS SAMPLES(AQ#) ARE REPORTED IN UG/L

**RISK LEVELS FOR AQ1 ARE BASED ON TAP WATER RISK LEVELS

***RISK LEVELS ARE BASED ON US EPA REGION III ROY L. SMITH'S RISK - BASED CONCENTRATION TABLE

AR000011

DIAPYND STATE SALVAGE SEMIVOLATILE DATA

COMPOUND	\$10	\$11	\$12	\$13	\$14	\$15	\$16	\$17	\$18	\$19	RISK LEVEL ***
Phenol	U	U	5.80	4.40	U	5.30	U	U	U	U	47000
bis(2-chloroethyl) ether	U	U	U	U	U	U	U	U	U	U	0.580
2-Chlorophenol	U	U	U	U	U	U	U	U	U	U	390
1,3-Dichlorobenzene	U	U	U	U	U	U	U	U	U	U	7000
1,4-Dichlorobenzene	U	U	U	U	U	U	U	U	U	U	27
1,2-Dichlorobenzene	U	U	U	U	U	U	U	U	U	U	7000
2-Methylphenol	U	U	U	U	U	U	U	U	U	U	3900
2,2'-oxybis(1-Chloropropane)	U	U	U	U	U	U	U	U	U	U	3900
4-Methylphenol	U	U	U	U	U	U	U	U	U	U	0.091
N-Nitroso-di-n-propylamine	U	U	U	U	U	U	U	U	U	U	46
Hexachloroethane	U	U	U	U	U	U	U	U	U	U	39
Nitrobenzene	U	U	U	U	U	U	U	U	U	U	670
Isophorone	U	U	U	U	U	U	U	U	U	U	4800
2-Nitrophenol	U	U	U	U	U	U	U	U	U	U	1600
2,4-Dimethylphenol	U	U	U	U	U	U	U	U	U	U	230
bis(2-Chloroethoxy)methane	U	U	U	U	U	U	U	U	U	U	760
2,4-Dichlorophenol	U	U	U	U	U	U	U	U	U	U	3100
1,2,4-Trichlorobenzene	U	U	U	U	U	U	U	U	U	U	310
Naphthalene	U	U	2.50	U	9.00	25.00	U	U	9.90	25.00	8.2
4-Chloroaniline	U	U	U	U	U	U	U	U	U	U	550
Hexachlorobutadiene	U	U	U	U	U	U	U	U	U	U	58
4-Chloro-3-methylphenol	U	U	U	U	U	U	U	U	U	U	7800
2-Methylnaphthalene	U	U	2.50	U	7.30	6.10	U	U	6.10	U	6300
Hexachlorocyclopentadiene	U	U	U	U	U	U	U	U	U	U	4.7
2,4,6-Trichlorophenol	U	U	U	U	U	U	U	U	U	U	780000
2,4,5-Trichlorophenol	U	U	U	U	U	U	U	U	U	U	78
2-Chloronaphthalene	U	U	U	U	U	U	U	U	U	U	230
2-Nitroaniline	U	U	U	U	U	U	U	U	U	U	4700
Dimethylphthalate	U	U	U	U	U	U	U	U	U	U	160
Acenaphthylene	U	U	U	U	U	U	3.70	U	4.00	U	4600
2,6-Dinitrotoluene	U	U	U	U	U	U	U	U	U	U	310
3-Nitroaniline	U	U	U	U	U	U	U	U	U	U	160
Acenaphthene	U	U	U	U	30.00	U	U	U	35.00	U	3100
2,4-Dinitrophenol	U	U	U	U	U	U	U	U	U	U	230
4-Nitrophenol	U	U	U	U	U	U	U	U	U	U	4600
Dibenzofuran	U	U	U	U	18.00	U	U	U	18.00	U	310
2,4-Dinitrotoluene	U	U	U	U	U	U	U	U	U	U	160
Diethylphthalate	U	U	U	U	4.10	3.10	U	U	10.00	U	3100
4-Chlorophenyl-phenylether	U	U	U	U	28.00	2.20	U	U	34.00	1.30	230
Fluorene	U	U	U	U	U	U	U	U	U	U	0.004
4-Nitroaniline	U	U	U	U	U	U	U	U	U	U	4500
4,6-Dinitro-2-methylphenol	U	U	U	U	U	U	U	U	U	U	0.400
N-Nitrosodiphenylamine	U	U	U	U	U	U	U	U	U	U	
4-Bromophenyl-phenylether	U	U	U	U	U	U	U	U	U	U	
Hexachlorobenzene	U	U	U	U	U	U	U	U	U	U	

***RISK LEVELS FOR AQ1 ARE BASED ON TAP WATER RISK LEVELS

***SAMPLES (S#) ARE REPORTED IN MG/KG, AQUEOUS SAMPLES (AQ#), ARE REPORTED IN UG/L

AR000012

DI...ND STATE SALVAGE SEMIVOLAT... DATA

COMPOUND	AQ1	RISK LEVEL**	S1	S2	S3	S4	S5	S6	S7	S8	S9	RISK LEVEL
Peritachlorophenol	U	0.56	U	U	U	U	U	U	U	U	U	U
Phenanthrene	U		22	U	U	22.00	93.00	27.00	U	5.10	U	17.00
Anthracene	U	11000	U	U	U	U	27.00	12.00	U	2.30	U	5.70
Carbazole	U	3.4	U	U	U	U	12.00	3.90	U	U	U	U
Di-n-butylphthalate	U		21	U	U	U	6.70	11.00	U	3.10	U	U
Fluoranthene	U	1500	36	U	U	41.00	92.00	33.00	U	11.00	U	30.00
Pyrene	U	1100	51	U	U	35.00	66.00	42.00	U	10.00	U	32.00
Butylbenzylphthalate	U	7300	57	U	U	470.00	42.00	86.00	U	14.00	U	34.00
3,3'-Dichlorobenzidine	U	0.15	U	U	U	U	U	U	U	U	U	U
Benzo(a)anthracene	U	0.092	U	U	U	21.00	36.00	20.00	U	8.60	U	17.00
Chrysene	U	9.2	U	U	U	20.00	37.00	23.00	U	10.00	U	18.00
bis(2-Ethylhexyl)phthalate	0.03	4.8	150	110.00	U	100.00	67.00	190.00	160.00	43.00	U	54.00
Di-n-octyl phthalate	U	730	210	U	U	U	U	26.00	U	2.40	U	U
Benzo(b)fluoranthene	U	0.092	17	U	U	20.00	34.00	26.00	U	13.00	U	19.00
Benzo(k)fluoranthene	U	0.92	13	U	U	16.00	29.00	14.00	U	6.40	U	21.00
Benzo(a)pyrene	U	0.0092	U	U	U	16.00	35.00	16.00	U	7.50	U	16.00
Indeno(1,2,3-cd)pyrene	U	0.092	12	U	U	14.00	22.00	15.00	U	7.90	U	11.00
Dibenz(a,h)anthracene	U	0.0092	U	U	U	U	7.60	4.80	U	2.60	U	3.70
Benzo(g,h,i)perylene	U		U	U	U	13.00	25.00	14.00	U	9.20	U	14.00

*SOIL SAMPLES (S#) ARE REPORTED IN MG/KG, AQUEOUS SAMPLES(AQ#) ARE REPORTED IN UG/L

**RISK LEVELS FOR AQ1 ARE BASED ON TAP WATER RISK LEVELS

***RISK LEVELS ARE BASED ON US EPA REGION III ROY L. SMITH'S RISK-BASED CONCENTRATION TABLE

AR0000013

DIAPYND STATE SALVAGE SEMIVOLATILE DATA

COMPOUND	S10	S11	S12	S13	S14	S15	S16	S17	S18	S19	RISK LEVEL ***
Pentachlorophenol	U	U	U	U	U	U	U	U	U	U	63
Phenanthrene	U	U	6.40	6.60	140.00	24.00	21.00	6.60	240.00	66.00	
Anthracene	U	U	3.00	2.30	47.00	10.00	7.50	3.20	69.00	26.00	23000
Carbazole	U	U	U	U	30.00	3.30	2.60	U	34.00	11.00	32
Di-n-butylphthalate	U	U	9.20	45.00	4.90	U	13.00	U	140.00	6.70	
Fluoranthene	U	U	9.50	6.00	130.00	34.00	28.00	1.00	280.00	110.00	3100
Pyrene	71.00	21.00	14.00	11.00	110.00	56.00	48.00	14.00	320.00	110.00	2300
Butylbenzylphthalate	31.00	U	36.00	91.00	9.80	190.00	56.00	12.00	370.00	330.00	16000
3,3'-Dichlorobenzidine	U	U	U	U	U	U	U	U	U	U	0.069
Benzo(a)anthracene	U	U	6.70	4.60	61.00	25.00	19.00	7.10	150.00	48.00	0.880
Chrysene	U	U	7.30	6.20	52.00	31.00	21.00	11.00	140.00	55.00	88
bis(2-Ethylhexyl)phthalate	350.00	150.00	19.00	89.00	58.00	81.00	140.00	34.00	85.00	91.00	46
Di-n-octyl phthalate	92.00	U	U	U	4.50	U	8.80	U	U	U	1600
Benzo(b)fluoranthene	U	U	9.20	8.00	80.00	34.00	24.00	17.00	110.00	57.00	0.880
Benzo(k)fluoranthene	U	U	5.10	5.10	46.00	23.00	19.00	13.00	69.00	37.00	8.800
Benzo(e)pyrene	U	U	5.30	4.90	42.00	20.00	16.00	9.20	78.00	37.00	0.088
Indeno(1,2,3-cd)pyrene	U	U	5.40	4.80	29.00	14.00	15.00	9.30	52.00	29.00	0.880
Dibenz(a,h)anthracene	U	U	U	U	16.00	4.10	4.60	4.50	17.00	U	0.088
Benzo(g,h,i)perylene	U	U	6.30	7.60	U	16.00	17.00	9.90	45.00	24.00	

*SOIL SAMPLES (S#) ARE REPORTED IN MG/KG, AQUEOUS SAMPLES(AQ#) ARE REPORTED IN UG/L

**RISK LEVELS FOR AQ1 ARE BASED ON TAP WATER RISK LEVELS.

***RISK LEVELS ARE BASED ON US EPA REGION III ROY L. SMITH'S RISK-BASED CONCENTRATION TABLE

AR000014

Attachment 4: Material Safety Data Sheets

AR000015

- H508
NAME OF SUBSTANCE LEAD OXIDE
CAS REGISTRY NUMBER 1317-36-3
IMMEDIATELY DANGEROUS TO ND
EYES OR HEALTH

ACCEPTABLE DAILY INTAKES

Tolerable intake of lead for preschool children should be less than the 3 mg/wk recommended provisionally for adults ... /Inorganic lead/ [WHO; Environ Health Criteria: Lead p.127 (1977)] **PEER REVIEWED**

ALLOWABLE TOLERANCES ND

OSHA STANDARDS

OSHA Permissible Exposure Limit: 50 ug/cu m, 8 hr Time-Weighted Average. /Fumes and dusts, as Pb/ [29 CFR 1910.1025 (7/1/87)] **PEER REVIEWED**

OSHA STANDARDS

Meets criteria for OSHA medical records rule. /Inorganic lead/ [29 CFR 1910.20 (7/1/87)] **PEER REVIEWED**

NIOSH RECOMMENDATIONS

NIOSH Recommended Exposure Limit: <100 ug/cu m Time-Weighted Average; air level to be maintained so that worker blood lead remains less than or equal to 60 ug/100 g. Recommendations are based on exposures up to 10 hr. /Inorganic lead/ [NIOSH/CDC. NIOSH Recommendations for Occupational Safety and Health Standards Sept. 1986. (Supplement to Morbidity and Mortality Weekly Report 35 No. 15, Sept. 26, 1986) 21S] **PEER REVIEWED**

THRESHOLD LIMIT VALUES

Time Weighted Avg (TWA) 0.15 mg/cu m (1936) /Lead inorganic dusts & fumes, as Pb/ [American Conference of Governmental Industrial Hygienists. Threshold Limit Values and Biological Exposure Indices for 1989-1990. Cincinnati, OH: American , p. 27] **UNREVIEWED**

THRESHOLD LIMIT VALUES

Excursion Limit Recommendation: Excursions in worker exposure levels may exceed three times the TLV-TWA for no more than a total of 30 min during a work day and under no circumstances should they exceed five times the TLV-TWA, provided that the TLV-TWA is not exceeded. /Lead inorganic dusts & fumes, as Pb/ [American Conference of Governmental Industrial Hygienists. Threshold Limit Values and Biological Exposure Indices for 1989-1990. Cincinnati, OH: American , p. 6] **UNREVIEWED**

THRESHOLD LIMIT VALUES

An identifiable population group might have an incr susceptibility to the effect of the chemical, thus leaving it unprotected by the recommended BEI. (1987-1988 adoption) /Lead/ [American Conference of Governmental Industrial Hygienists. Threshold Limit Values and Biological Exposure Indices for 1989-1990. Cincinnati, OH: American , p. 63] **UNREVIEWED**

THRESHOLD LIMIT VALUES

BEI (Biological Exposure Index): Lead in blood (timing is not critical) is 50 ug/100 ml. The determinant is usually present in a significant amt in biological specimens collected from subjects who have not been occupationally exposed. Such background levels are incl in the BEI value. (1987-1988 adoption) /Lead/ [American Conference of Governmental Industrial Hygienists. Threshold Limit Values and Biological Exposure Indices for 1989-1990. Cincinnati, OH: American , p. 63] **UNREVIEWED

THRESHOLD LIMIT VALUES

AR000016

BEI (Biological Exposure Index): Lead in urine (timing is not critical) is 150 ug/g creatinine. The determinant is usually present in a significant amt in biological specimens collected from subjects who have not been occupationally exposed. Such background levels are incl in the BEI value. (1987-1988 adoption) /Lead/ [American Conference of Governmental Industrial Hygienists. Threshold Limit Values and Biological Exposure Indices for 1989-1990. Cincinnati, OH: American , p. 63] **UNREVIEWED**

THRESHOLD LIMIT VALUES

BEI (Biological Exposure Index): Zinc protoporphyrin in blood after 1 month exposure is 250 ug/100 ml erythrocytes or 100 ug/100 ml blood. The determinant is usually present in a significant amt in biological specimens collected from subjects who have not been occupationally exposed. Such background levels are incl in the BEI value. (1987-1988 adoption) /Lead/ [American Conference of Governmental Industrial Hygienists. Threshold Limit Values and Biological Exposure Indices for 1989-1990. Cincinnati, OH: American , p. 63] **UNREVIEWED**

OTHER OCCUPATIONAL ND

PERMISSIBLE LEVELS

WATER STANDARDS

... EPA is promulgating ... notification requirements for lead require public water systems to identify and provide notice to persons who may be affected by lead contamination in their drinking water, where such contamination results from the use of lead in the construction materials of the distribution system. These notification requirements, which apply to owners and operators of community and non-transient non-community water systems, apply in addition to the general public notification requirements for lead. /Lead ion/ [52 FR 41534 (10/28/87)] **PEER REVIEWED**

WATER STANDARDS

Toxic pollutant designated pursuant to section 307(a)(1) of the Clean Water Act and is subject to effluent limitations. /Lead and inorganic and organic lead compounds/ [40 CFR 401.15 (7/1/87)] **PEER REVIEWED**

WATER STANDARDS

The maximum contaminant level (MCL) of lead as Pb ion in drinking water is 0.05 mg/l. /Lead as Pb ion/ [40 CFR 141.11 (7/1/87)] **PEER REVIEWED**

WATER STANDARDS

... Acute and chronic toxicity to salt water aquatic life occurs at concn as low as 668 and 25 ug/l, respectively. /Lead ion/ [USEPA; Ambient Water Quality Doc: Lead p.8-11 (1980)] **PEER REVIEWED**

ATMOSPHERIC STANDARDS

National primary and secondary ambient air quality standard for lead and its compounds, measured as elemental lead is: 1.5 ug/cu m, maximum arithmetic mean averaged over a calendar quarter. /Lead and its compounds, as Pb/ [40 CFR 50.12 (7/1/87)] **PEER REVIEWED**

SOIL STANDARDS ND

RCRA REPORTABLE ND

QUANTITIES

TSCA REQUIREMENTS ND

RCRA REQUIREMENTS

A solid waste containing lead oxide may become characterized as a hazardous waste when subjected to the Toxicant Extraction Procedure listed in 40 CFR 261.24, and if so characterized, must be managed as a

AR000017

hazardous waste. [40 CFR 261.24 (7/1/87)] **PEER REVIEWED**

RA REQUIREMENTS

The Environmental Protection Agency is ... /promulgated/ regulations concerning ground-water monitoring with regard to screening suspected contamination at land based hazardous waste treatment, storage, and disposal facilities. ... There are/ new requirements to analyze for a specified core list of chemicals plus those chemicals specified by the Regional Administrator on a site-specific basis. ... /Total lead (all species) is included on this list./ /Total lead (all species)/ [52 FR 25942 (7/9/87)] **PEER REVIEWED**

FIFRA REQUIREMENTS

ND

FDA REQUIREMENTS

Bottled water shall, when a composite of analytical units of equal volume from a sample is examined by the methods described in paragraph (d)(1)(ii) of this section, meet the standards of chemical quality and shall not contain lead as Pb ion in excess of 0.05 mg/l. /Lead as Pb ion/ [21 CFR 103.35 (4/1/86)] **PEER REVIEWED**

FDA REQUIREMENTS

The FDA action level of lead is 7.0 ug/ml of leaching soln for pottery (ceramics) flatware (avg of 6 units); 5.0 ug/ml of leaching soln for small hollowware (any one of 6 units); 2.5 ug/ml of leaching soln for large hollowware (any one of 6 units); 7.0 ug/ml of leaching soln if product intended for use by adults for silver-plated hollowware (avg of 6 units); and 0.5 ug/ml of leaching soln if product intended for use by infants and children for silver-plated hollowware (one or more of 6 units). /Inorganic lead/ [FDA; Action Levels for Poisonous or Deleterious Substances in Human Food and Animal Feed p.9 (1982)] **PEER REVIEWED**

SAMPLING PROCEDURES

Analyte: Lead; Matrix: Air; Sampler: Filter (0.8-um cellulose ester membrane); Flow rate: 1 to 4 l/min; Vol: min: 200 l @ 0.05 mg/cu m, max: 1200 l; Stability: stable. /Lead and lead cmpd/ [U.S. Department of Health and Human Services, Public Health Service. Centers for Disease Control, National Institute for Occupational Safety and Health. NIOSH V2 7082-1] **PEER REVIEWED**

SAMPLING PROCEDURES

Analyte: Lead; Specimen: Blood or tissue; Vol: 10 ml blood, or 1 g tissue; Preservative: Heparin for blood, none for tissue; Controls: collect 3 blood specimens from unexposed workers; Stability: not established. /Lead and lead cmpd/ [U.S. Department of Health and Human Services, Public Health Service. Centers for Disease Control, National Institute for Occupational Safety and Health. NIOSH V1 8005-1] **PEER REVIEWED**

SAMPLING PROCEDURES

Analyte: Lead; Specimen: whole blood, urine; Preservative: (urine) 0.2 ml conc nitric acid; Anticoagulant: (blood) heparin; Controls: commercial urine and blood lead control samples plus pooled urine and blood from non-exposed populations; Stability: (blood) 3 days @ 4 deg C, indefinitely if sonicated and frozen in plastic tubes, (urine) indefinitely if kept acidified with nitric acid. /Lead and lead cmpd/ [U.S. Department of Health and Human Services, Public Health Service. Centers for Disease Control, National Institute for Occupational Safety and Health. NIOSH V1 8003-1] **PEER REVIEWED**

SAMPLING PROCEDURES

AR000018

Lead dust or fume is collected on 0.45 micrometer cellulose membrane filters mounted in either 2- or 3-piece filter cassettes. Air is drawn through the filter by means of a pump at a rate of 2 l/min (not less than 1 nor more than 4 l/min). A minimum sample of 100 liters shall be collected. Larger sample volumes are encouraged, provided the filters do not become loaded with dust to the point that loose material would fall off or the filters would become clogged. With each group of samples, one filter, labeled as a blank, shall be submitted and no air shall be drawn through this filter. /Lead and lead compd/ [NIOSH; Criteria Document: Inorganic Lead p.VII-1 (1978) DHEW Pub. NIOSH 78-158] **PEER REVIEWED**

SAMPLING PROCEDURES

TWO AUTOMATIC SAMPLING APPARATUS BASED ON THE BETA RAY ABSORPTION AND ON THE TYNDALL EFFECTS ARE DESCRIBED. (204)PB DUSTS WERE MEASURED. /LEAD AND LEAD COMPD/ [CECCHETTI G ET AL; ANN INST SUPER SANITA 13 (1-2): 103 (1977)] **PEER REVIEWED**

ANALYTIC LABORATORY METHODS

Air: Analysis by atomic absorption spectroscopy using an air acetylene flame. The method has a typical range of 0.07 - 7.5 ug Pb/cu m. Water: atomic absorption spectroscopy, optimum concn range for the 283.3 nm absorption is 1-20 mg/l with an estimated detection limit of 0.1 mg/l. /Total lead/ [USEPA; Intermedia Priority Pollutant Guidance Document: Lead p.9-1 (1982)] **PEER REVIEWED**

ANALYTIC LABORATORY METHODS

Analysis of lead in water is typically accomplished with atomic absorption and emission spectroscopy... It is commonly necessary to concentrate the sample by chelating and extracting the lead or by evaporating the water, since the natural lead content of lakes and rivers is in the range of 1 to 10 ug/l. /Total lead/ [USEPA; Air Quality Criteria for Lead p.4-5 (1977) EPA 600/8-77-017] **PEER REVIEWED**

ANALYTIC LABORATORY METHODS

Water: colorimetric method using dithizone. Analytical range is 1.0-30.0 ug Pb. Water: differential pulse anodic stripping voltammetry method. Limit of detection is 0.001 mg/l. Can be used to detect levels up to 0.1 mg/l. /Total lead/ [USEPA; Intermedia Priority Pollutant Guidance Document: Lead p.9-2 (1982)] **PEER REVIEWED**

ANALYTIC LABORATORY METHODS

AIR SAMPLES OF LEAD OR INORGANIC LEAD COMPOUNDS ARE DETERMINED BY ATOMIC ABSORPTION SPECTROPHOTOMETRY; PROCEDURE: FILTER COLLECTION, NITRIC ACID DIGESTION. RANGE: 0.128 TO 0.399 MG/CU M WITH COEFFICIENT OF VARIATION OF 0.072 FOR TOTAL ANALYTICAL & SAMPLING METHOD. THIS VALUE CORRESPONDS TO 0.014 MG/CU M STD DEVIATION AT OSHA STD LEVEL OF 0.2 MG/CU M. /TOTAL LEAD/ [U.S. Department of Health, Education Welfare, Public Health Service. Center for Disease Control, National Institute for Occupational Safety Health. NIOSH Manual of V3 S341-1] **PEER REVIEWED**

ANALYTIC LABORATORY METHODS

MATRIX: AIR; RANGE: 42-840 UG/CU M; PROCEDURE: FILTER COLLECTION, ACID DIGESTION, ATOMIC ABSORPTION SPECTROPHOTOMETRY. /TOTAL LEAD/ [U.S. Department of Health, Education Welfare, Public Health Service. Center for Disease Control, National Institute for Occupational Safety Health. NIOSH Manual of V5 173-1] **PEER REVIEWED**

ANALYTIC LABORATORY METHODS

AR000019

Analyte: Lead. Matrix: air. Procedure: Atomic absorption, flame (air-acetylene, oxidizing). Wavelength: 283.3 nm. Range: 10 to 200 ug/sample. Precision: 0.03. The working range is 0.025 to 0.5 mg/cu m for a 400 l air sample. The method is applicable to elemental lead, including lead fume, & all other aerosols containing lead. This is an elemental analysis, not compound specific. Interferences: Use D2 or H2 continuum background correction to control flame or molecular absorption. High concentrations of calcium, sulfate, carbonate, phosphate, iodide, fluoride, or acetate can be corrected. /Total lead/ [U.S. Department of Health and Human Services, Public Health Service. Centers for Disease Control, National Institute for Occupational Safety and Health. NIOSH V2 7082-1] **PEER REVIEWED**

ANALYTIC LABORATORY METHODS

Analyte: lead; matrix: air; procedure: filter collection, acid digestion, inductively coupled plasma-atomic emission spectroscopy; detection limit: 17 ng/l. /Total lead/ [U.S. Department of Health, Education Welfare, Public Health Service. Center for Disease Control, National Institute for Occupational Safety Health. NIOSH Manual of V7 351-1] **PEER REVIEWED**

ANALYTIC LABORATORY METHODS

METHOD FOR DETERMINATION OF LEAD (PB) IN FOOD PRODUCTS (GRAIN PRODUCTS, FRUIT JUICE, MEAT, & VEGETABLES) INVOLVES CO-PRECIIPITATION OF PB WITH STRONTIUM SULFATE, CONVERSION TO CARBONATE, DISSOLUTION IN NITRIC ACID, & DETERMINATION BY ATOMIC ABSORPTION SPECTROTOMETRY. /TOTAL LEAD/ [HOOVER WL; J ASSOC OFF ANAL CHEM 55 (4): 737 (1972)] **PEER REVIEWED**

ANALYTIC LABORATORY METHODS

DETERMINATION OF LEAD IN FOOD SAMPLE BY ANODIC STRIPPING VOLTAMMETRY. /TOTAL LEAD/ [HOLAK W; J ASSOC OFF ANAL CHEM 63 (3): 485 (1930)] **PEER REVIEWED**

ANALYTIC LABORATORY METHODS

DETERMINATION OF LEAD IN CEREAL & GRASS SAMPLES BY FLAMELESS ATOMIC ABSORPTION SPECTROSCOPY. /TOTAL LEAD/ [HORAK O; LANDWIRTSCH FORSCH 29 (3-4): 239 (1976)] **PEER REVIEWED**

CLINICAL LABORATORY METHODS

... A simplified method for estimating urinary coproporphyrin as a lead exposure index /was developed/. Samples are acidified with acetic acid and coproporphyrin is extracted into ether. The ether extract is shaken with an iodine-hydrochloric acid solution which oxidizes any coproporphyrinogen to coproporphyrin. Concn is measured by absorbance at the Soret band peak (ca 401 nm). /Total lead/ [NIOSH; Criteria Document: Inorganic Lead p.XI-29 (1978) DHEW Pub. NIOSH 78-158] **PEER REVIEWED**

CLINICAL LABORATORY METHODS

MICRODETERMINATION OF LEAD IN BLOOD & URINE BY ANODIC STRIPPING VOLTAMMETRY EQUIPPED WITH MERCURY ELECTRODE. NO INTERFERENCE WAS FOUND WITH COEXISTING IONS FOUND IN URINE. /TOTAL LEAD/ [KARAI I ET AL; OSAKA CITY MED J 26 (1): 39-46 (1981)] **PEER REVIEWED**

CLINICAL LABORATORY METHODS

High performance liquid chromatography assay of RBC UMPase activity is a sensitive and rapid assay that appears to meet criteria for a reliable clinical laboratory index of blood lead concentrations. /Total lead/ [Cook LR et al; Br J Ind Med 43: 387-90 (1986)] **PEER REVIEWED**

CLINICAL LABORATORY METHODS

Biological indicator of exposure to lead or lead compounds. Analyte:

AR000020

Lead. Matrix: blood or tissue. Method: Inductively-coupled argon plasma-atomic emission spectroscopy. Wavelength: 220.4 nm. Precision: 0.85. This method is useful for monitoring the blood of workers exposed to several metals simultaneously. This is a simultaneous multielemental analysis, but is not compound-specific. /Total lead/ [U.S. Department of Health and Human Services, Public Health Service. Centers for Disease Control, National Institute for Occupational Safety and Health. NIOSH V1 8005-1] **PEER REVIEWED**

CLINICAL LABORATORY METHODS

Biological indicator of exposure to lead & lead compounds. Analyte: Lead(II)-APDC (ammonium pyrrolidine dithiocarbamate) complex. Matrix: blood or urine. Technique: atomic absorption, air/acetylene. Quality control: commercial controls, pooled urine or blood, urine corrected for creatinine. Extraction: APDC-MIBK (methyl isobutyl ketone). Range: 5 to 150 ug/100 g blood; 5 to 150 ug/100 ml urine. Precision: 0.05. This procedure quantitates Pb(2+) in blood or urine to assess body burden, injury to the hematopoietic system, & to comply with Federal regulations. Blood lead is the preferred biological indicator of lead absorption. The optimum working range is 0.1 to 1.5 ug Pb/g or per ml urine. Interferences: Phosphate, EDTA, & oxalate can sequester lead and cause low lead readings. /Total lead/ [U.S. Department of Health and Human Services, Public Health Service. Centers for Disease Control, National Institute for Occupational Safety and Health. NIOSH V1 8003-1] **PEER REVIEWED**

CLINICAL LABORATORY METHODS

Lead analyses of skeletal biopsies obtained from vertebrae of active and retired lead workers and the in vivo x-ray fluorescence (XRF) analysis of lead in fingerbone were determined. The types of lead exposure were smelter workers, brass founders, scrapping of red-lead goods, storage battery plant worker, plastic factory worker using lead stearate, and spray painter using red lead oxide. /Inorganic lead compounds/ [Schutz A et al; Arch Environ Health 42 (6): 340-6 (1987)] **PEER REVIEWED**

AR000021

VAPOR PRESSURE
RELATIVE EVAPORATION RATE
VISCOSITY
OTHER CHEMICAL/PHYSICAL
PROPERTIES

10 mm Hg at 1085 deg C [Weast, R.C. (ed.) Handbook of Chemistry and Physics, 68th ed. Boca Raton, Florida: CRC Press Inc., 1987-1988. D-193] **PEER REVIEWED**

ND

ND

LITHARGE: DENSITY, 9.3; MP: 386 DEG C; SOLUBILITY: 0.001 G/100 CC WATER @ 20 DEG C, SOL IN NITRIC ACID, ALKALI, LEAD ACETATE, AMMONIUM CHLORIDE, STRONTIUM CHLORIDE, CALCIUM CHLORIDE; COFO: YELLOW, TETRAGONAL CRYSTALS /LITHARGE/ [Weast, R.C. (ed.) Handbook of Chemistry and Physics, 68th ed. Boca Raton, Florida: CRC Press Inc., 1987-1988. B-100] **PEER REVIEWED**

OTHER CHEMICAL/PHYSICAL
PROPERTIES

COMMERCIAL GRADES ARE YELLOW TO REDDISH, DEPENDING ON TREATMENT & PURITY. [Sax, N.I. and R.J. Lewis, Sr. (eds.). Hawley's Condensed Chemical Dictionary. 11th ed. New York: Van Nostrand Reinhold Co., 1987. , p. 706] **PEER REVIEWED**

OTHER CHEMICAL/PHYSICAL
PROPERTIES

MASSICOT: AN OXIDE OF LEAD CORRESPONDING TO SAME FORMULA AS LITHARGE (PBO) BUT HAVING DIFFERENT PHYSICAL STATE; CONTAINS APPROX 92.8% LEAD /MASSICOT/ [Sax, N.I. and R.J. Lewis, Sr. (eds.). Hawley's Condensed Chemical Dictionary. 11th ed. New York: Van Nostrand Reinhold Co., 1987. , p. 733] **PEER REVIEWED**

OTHER CHEMICAL/PHYSICAL
PROPERTIES

MASSICOT: INDEX OF REFRACTION: 2.51, 2.61 (LI), 2.71; SOLUBILITY: 0.0023 G/100 CC WATER @ 23 DEG C, INSOL IN COLD WATER; SOL IN ALKALI; DENSITY: 8.0; YELLOW, RHOMBIC CRYSTALS /MASSICOT/ [Weast, R.C. (ed.) Handbook of Chemistry and Physics, 68th ed. Boca Raton, Florida: CRC Press Inc., 1987-1988. B-100] **PEER REVIEWED**

OTHER CHEMICAL/PHYSICAL
PROPERTIES

AT 300-450 DEG C IN AIR CONVERTED SLOWLY INTO LEAD TETRAOXIDE BUT AT HIGHER TEMP REVERTS TO LEAD OXIDE [The Merck Index. 10th ed. Rahway, New Jersey: Merck Co., Inc., 1983. , p. 778] **PEER REVIEWED**

OTHER CHEMICAL/PHYSICAL
PROPERTIES

Divalent lead has a strong affinity for inorganic ions containing oxygen (eg, carbonate) or sulfur (sulfide). Lead can also complex with electron rich ligands in many organic compd such as amino acids, proteins, and humic acid. /Inorganic lead/ [Kayser, R., D. Sterling, D. Viviani (eds.). Intermedia Priority Pollutant Guidance Documents. Washington, DC: U.S.Environmental Protection Agency, July 1982. 1-1] **PEER REVIEWED**

AR000022

- MSDS
NAME OF SUBSTANCE
CAS REGISTRY NUMBER
FORM/FORM

ODOR
TASTE
BOILING POINT
MELTING POINT

MOLECULAR WEIGHT

CORROSIVITY
CRITICAL TEMPERATURE &
PRESSURE
DENSITY/SPECIFIC GRAVITY

DISSOCIATION CONSTANTS
HEAT OF COMBUSTION
HEAT OF VAPORIZATION
OIL/WATER PARTITION
COEFFICIENT
P

SOLUBILITIES

SOLUBILITIES

SOLUBILITIES

SOLUBILITIES

SPECTRAL PROPERTIES
SURFACE TENSION
REFRACTIVE INDEX

LEAD OXIDE
1317-36-8
EXISTS IN 2 FORMS: RED TO REDDISH-YELLOW,
TETRAGONAL CRYSTALS & YELLOW, ORTHORHOMBIC
CRYSTALS [The Merck Index. 10th ed. Rahway, New
Jersey: Merck Co., Inc., 1983. , p. 778] **PEER
REVIEWED**
ND
ND
ND
888 DEG C [The Merck Index. 10th ed. Rahway, New
Jersey: Merck Co., Inc., 1983. , p. 778] **PEER
REVIEWED**
223.21 [The Merck Index. 10th ed. Rahway, New
Jersey: Merck Co., Inc., 1983. , p. 778] **PEER
REVIEWED**
ND
ND
9.53 [The Merck Index. 10th ed. Rahway, New
Jersey: Merck Co., Inc., 1983. , p. 778] **PEER
REVIEWED**
ND
ND
ND
ND
STRONG BASE [Sax, N.I. and R.J. Lewis, Sr. (eds.).
Hawley's Condensed Chemical Dictionary. 11th ed.
New York: Van Nostrand Reinhold Co., 1987. , p.
706] **PEER REVIEWED**
INSOL IN ALCOHOL; SOL IN ACETIC ACID, DIL NITRIC
ACID, WARM SOLN OF FIXED ALKALI HYDROXIDES [The
Merck Index. 10th ed. Rahway, New Jersey: Merck
Co., Inc., 1983. , p. 778] **PEER REVIEWED**
0.017 g/l @ 20 deg C [IARC. Monographs on the
Evaluation of the Carcinogenic Risk of Chemicals
to Man. Geneva: World Health Organization,
International Agency for Research on Cancer,
1972-1985. (Multivolume work). V23 327 (1980)]
PEER REVIEWED
Sol in ammonium chloride, nitric acid [IARC.
Monographs on the Evaluation of the Carcinogenic
Risk of Chemicals to Man. Geneva: World Health
Organization, International Agency for Research on
Cancer, 1972-1985. (Multivolume work). V23 327
(1980)] **PEER REVIEWED**
0.0504 g/l at 20 deg C [Carr, DS; Kirk-Othmer's
Encycl Chem Tech 3rd ed. 14: 160-80 (1981)] **PEER
REVIEWED**
ND
ND
ND

AR000023

- HSDB
 NAME OF SUBSTANCE
 CAS REGISTRY NUMBER
 NAME OF SUBSTANCE
 CAS REGISTRY NUMBER
 RELATED HSDB RECORDS
 SYNONYMS
 SYNONYMS
 SYNONYMS
 SYNONYMS
 SYNONYMS
 SYNONYMS
 SYNONYMS
 SYNONYMS
 SYNONYMS
 SYNONYMS
 SYNONYMS
 SYNONYMS
 SYNONYMS
 SYNONYMS
 MOLECULAR FORMULA
 WISWESSER LINE NOTATION
 RTECS NUMBER
 OWM-TADS NUMBER
 SHIPPING NAME/NUMBER -
 DOT/UN/NA/IMCO
 S C NUMBER
 EPA HAZARDOUS WASTE
 NUMBER

LEAD OXIDE
 1317-36-8
 LEAD OXIDE
 1317-36-8
 231 [LEAD]
 LEAD MONOOXIDE **PEER REVIEWED**
 LEAD MONOXIDE **PEER REVIEWED**
 LEAD OXIDE YELLOW **PEER REVIEWED**
 LEAD PROTOXIDE **PEER REVIEWED**
 LEAD(2+) OXIDE **PEER REVIEWED**
 LEAD(II) OXIDE **PEER REVIEWED**
 LEAD OXIDE (PbO) **PEER REVIEWED**
 CI Pigment yellow 46 **PEER REVIEWED**
 CI 77577 **PEER REVIEWED**
 Massicotite **PEER REVIEWED**
 Plumbous oxide **PEER REVIEWED**
 Yellow lead ochre **PEER REVIEWED**
 Litharge **PEER REVIEWED**
 Massicot **PEER REVIEWED**
 Litharge pure **PEER REVIEWED**
 Litharge yellow L-28 **PEER REVIEWED**
 O-Pb **QC REVIEWED**

ND
 NIOSH/OG1750000
 ND
 ND

ND
 D008; A waste containing lead oxide may (or may not) be characterized a hazardous waste following testing by the Toxicant Extraction Procedure as prescribed by the Resource Conservation and Recovery Act (RCRA) regulations.
 ND

ASSOCIATED CHEMICALS

AR000024

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CHEMICAL: POLYCHLORINATED BIPHENYLS

CAS #: 1336-36-3

NOAA #: 4286

UN #: 2315 STCC: 4963348

RTECS: TQ1350000

FORMULA:

LABEL: CLASS 9

NFPA CODES: H2 F1 R0 S

CERCLA (Y/N): Y

EHS (Y/N):

313 (Y/N): Y

RCRA:

RQ: 1

TPQ:

LAST UPDATE:10/20/92

STATE at ambient temperature: [Gas, Liquid, Solid] (G/L/S):

LEVEL OF CONCERN: 0.00000000 gm/m3

LIQUID AMBIENT FACTOR:

LIQUID BOILING FACTOR:

LIQUID MOLTEN FACTOR:

SYNONYMS

1,1'-BIPHENYL, CHLORO DERIVS.

AROCLOR

AROCLOR 1016

AROCLOR 1221

AROCLOR 1232

AROCLOR 1242

AROCLOR 1248

AROCLOR 1254

AROCLOR 1260

AROCLOR 1262

AROCLOR 1268

AROCLOR 2565

AROCLOR 4465

AROCLOR 5442

BIPHENYL, CHLORINATED

BIPHENYL, POLYCHLORO-

CHLOPHEN

CHLOREXTOL

HLORINATED BIPHENYL

AR000025

CHLORINATED DIPHENYL
CHLORINATED DIPHENYLENE
CHLORO 1,1-BIPHENYL
CHLORO BIPHENYL
CLOPHEN
DIPHENYL, CHLORINATED
DYKANOL
FENCLOL
FENCLOL 42
INERTEEN
KANECHLOR
KANECHLOR 300
KANECHLOR 400
MONTAR
NOFLAMOL
PCB
PCBS
PHENOCHLOR
PHENOCLOL
POLYCHLORINATED BIPHENYL
POLYCHLORINATED BIPHENYLS
POLYCHLORINATED BIPHENYLS (DOT)
POLYCHLOROBIPHENYL
PYRALENE
PYRANOL
SANTOTHERM
SANTOTHERM FR
SOVOL
THERMINOL FR-1

CAMEO Response Information

[NOAA, 7600 Sand Point Way NE, Seattle, WA 98115 (206) 526-6317]

GENERAL DESCRIPTION:

Polychlorinated biphenols is a clear light colored liquid. In this solution it poses little acute health hazards to humans. However it may cause considerable damage to the environment unless properly cleaned up and debris correctly disposed of. ((c) AAR, 1991)YA

FIRE & EXPLOSIVE HAZARD:

Combustible. Irritating gases are generated in fires. (USCG, 1991) #

FIRE FIGHTING:

Extinguish fire using agent suitable for type of surrounding fire (material itself does not burn or burns with difficulty). Keep run-off water out of sewers and water sources. ((c) AAR, 1991) 7

PROTECTIVE CLOTHING AND SUIT MATERIAL COMPATIBILITY (ACGIN 1985:)

AR000026

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Wear appropriate equipment to prevent any possibility of skin contact.
Wear eye protection to prevent reasonable probability of eye contact.
Workers should wash immediately when skin becomes contaminated.

Range: No recommendation applies to this category.

Remove clothing promptly if it is non-impervious clothing that becomes wet. (NIOSH, 1990)

MATERIAL RATINGS

BLUE MAX

FABRIC GT 3 hours

BUTYL

GLOVES GT 3 hours

CPE

FABRIC GT 3 hours

FEP TEFLON

GLOVES GT 3 hours

NAT RUB

GLOVES LT 1 hour

NEOP

GLOVES GT 3 hours

PE

FABRIC LT 1 hour

GLOVES 1-3 hours

.E/EVAL/PE

GLOVES GT 3 hours

PTFE TEFLON

FABRIC GT 3 hours

PVAL

GLOVES GT 3 hours

RESPONDER

FABRIC GT 3 hours

SARANEX23P

FABRIC GT 3 hours

VITON

GLOVES GT 3 hours

PRINTER

NONFIRE RESPONSE:

Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Attempt to stop leak if without undue personnel hazard. ((C) AAR, 1991)

HEALTH HAZARDS:

AR000027

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LIQUID OR SOLID: Irritating to skin and eyes. (USCG, 1991)

FIRST AID:

If this chemical contacts the eyes, immediately wash the eyes with large amounts of water, occasionally lifting the lower and upper lids.

Get medical attention immediately. Contact lenses should not be worn when working with this chemical.

If this chemical contacts the skin, immediately wash the contaminated skin with soap and water. If this chemical penetrates the clothing, immediately remove the clothing, wash the skin with soap and water, and get medical attention promptly.

If a person breathes large amounts of this chemical, move the exposed person to fresh air at once. If breathing has stopped, perform mouth-to-mouth resuscitation. Keep the affected person warm and at rest. Get medical attention as soon as possible.

If this chemical has been swallowed, get medical attention immediately.

(NIOSH, 1990)BQ

RL_IMPRT

CHEMICAL PROPERTIES:

Flash Point: >286 F (unspc) (USCG, 1991)

Lower Exp Limit: Not applicable (NIOSH, 1990)

Upper Exp Limit: Not applicable (NIOSH, 1990)

Melting Point: Not Applicable. (USCG, 1991)

Vapor Pressure: Not Applicable. (USCG, 1991)

Vapor Density (air = 1): Not Applicable. (USCG, 1991)

Specific Gravity, Liquid: 1.3 to 1.8 at 68 F (USCG, 1991)

Boiling Point: Very high. (USCG, 1991)

Molecular Weight: 326 (approx) (NIOSH, 1990)

IDLH: 5 mg/m3; a potential human carcinogen (NIOSH, 1990)

TLV TWA: 0.5 mg/m3 For chlorodiphenyl (54% Chlorine). Skin.

((c)ACGIH, 1991)

TLV STEL: 1 mg/m3 For chlorodiphenyl (54% Chlorine). Skin.

((c)ACGIH, 1991)KE5

AR000028

Attachment 5: TAT Analytical Review

AR000029



5 Underwood Court, Delran, New Jersey 08075-1229
609-461-4003 • 215-238-0338 • Fax 609-461-4916

TECHNICAL ASSISTANCE TEAM FOR EMERGENCY RESPONSE REMOVAL AND PREVENTION
EPA CONTRACT 68-WO-0036

MEMORANDUM

TO: Kevin Koob, OSC, EPA Region III
Eastern Response Section TDD #9505-018A
PCS #1487

FROM: Marian Murphy, TAT Region III 8/16/95

SUBJECT: Diamond State Sample Analytical Review

DATE: August 16, 1995

This report covers the general review of the data package submitted by Laboratory Resources, Inc., for one (1) water sample and nineteen (19) soil samples collected at the Diamond State Site on June 9, 1995. The sample was received at Laboratory Resources, Inc., in Teterboro, NJ on June 13, 1995. The analyses requested were base-neutral and acid extractables (BNA), pesticide/PCBs and target analyte list (TAL) metals.

ANALYTICAL METHODOLOGY

The samples were analyzed for BNAs by EPA Method 8270, for pesticide/PCBs by EPA Method 8080 and for TAL metals in accordance with EPA Contract Laboratory Program (CLP) Statement of Work ILM03.0.

- Signed chain-of-custody records were received.
- The BNA GC/MS tune data and internal standard data met criteria. The BNA initial and continuing calibration data did not meet criteria for all compounds, however, since none of the compounds were detected, no data was qualified. The hold times were met. The method blank contained phenol at 280 ug/Kg. Samples S6, S12, S13, S15 and S18 should be considered not detected for phenol since they were less than five times the blank concentration. The surrogate spike recoveries, matrix spike/matrix spike duplicate (MS/MSD) recoveries and relative percent difference (RPD) values met criteria.

AR000030

Roy F. Weston, Inc.

FEDERAL PROGRAMS DIVISION

In Association with Foster Wheeler USA Corporation, Resource Applications, Inc., C.C. Johnson & Malhotra, P.C.,
R.E. Sarriera Associates, and GRB Environmental Services, Inc.

- The pesticide/PCB initial and continuing calibration data met criteria. The hold times were met. The method blanks were free of contamination. The MS/MSD recoveries, surrogate spike recoveries and RPD values were not calculated because the spikes were diluted out. All hits were confirmed on a second column and met criteria.
- The TAL metals data met criteria. The hold times were met. The method blank for the water sample contained aluminum at 159 ug/L. The aluminum value for sample AQ1 should be considered not detected. The method blank for the soil samples contained sodium at 321 ug/L. The sodium result for sample S3 should be considered not detected. Some MS recoveries and RPD values did not meet criteria. The soil spikes for antimony, arsenic, nickel and selenium were low, therefore, the results for antimony, arsenic, nickel and selenium should be considered biased low. The RPD value for mercury for the soil samples did not meet criteria, therefore, the mercury results for the soil samples should be considered approximate. The serial dilution for lead the soil samples did not meet criteria, therefore, the lead results for the soil samples should be considered approximate.

CONCLUSION

Accept all pesticide/PCB as presented. Use the original run for all pesticide/PCBs except for samples S5 and S6. Use S5DL and S6DL since the original analysis was above the linear range. Accept all BNA results with the following exception; samples S6, S12, S13, S15 and S18 should be considered not detected for phenol due to blank contamination. Accept the metals results with the following exceptions: The antimony, arsenic, nickel and selenium results for the soil samples should be considered biased low due to low spike recoveries. The mercury results for the soil samples should be considered approximate due to RPD values not meeting criteria. The lead soil results should be considered approximate since the serial dilution did not meet criteria. The aluminum result for sample AQ1 and the sodium result for sample S3 should be considered not detected due to blank contamination.

AR000031

Attachment 6: Chain of Custody Records

AR000032

TS00201

CHAIN OF CUSTODY RECORD

ION 3

Curtis Bldg., 8th & Walnut Sts.
Philadelphia, Pennsylvania 19106

PROJ. NO.		PROJECT NAME		NO. OF CONTAINERS		REMARKS	
1487		Diamond State Salvage		3-802			
<p>SAMPLERS: (Signature) Kelly Lane</p> <p>Station Location: Along Church St Fence</p>							
STA. NO.	DATE	TIME	STATION LOCATION	NO.	OF	CONTAINERS	REMARKS
S19	4/18/85	1300	Along Church St Fence	3	802		
S18	4/18/85	1255	Pile near S. Gate				
S17	1	1310	South West Gate (44th)				
S16	1	1305	Along North of Building				
S15	1	1316	Middle Bank				
S14	1	1315	Midway bet. S. & N. Gates				
S13	1	1310	Bank side of river (44th)				
S12	1	1337	Bank side of river (44th)				
S11	1	1335	Bank side of river (44th)				
S10	1	1345	Area of Guilt (44th)				
S9	1	1308	Pile in middle of river				
S8	1	1339	North Gate				
S7	1	1300	Place of bald shore				
S6	1	1250	Pile North of river (44th)				
S5	1	1245	100 yds upstream from S. Gate				
Relinquished by: (Signature)		Date / Time		Received by: (Signature)		Date / Time	
Kelly Lane		4/12/85 1530		Fed Ex			
Relinquished by: (Signature)		Date / Time		Received by: (Signature)		Date / Time	
Relinquished by: (Signature)		Date / Time		Received for Laboratory by: (Signature)		Date / Time	
				R. D. Sage			

TS06201

1069051

[illegible]

Attachment 7: Site Location Map

AR000035



LEGEND

- Geo Feature
- Town, Small City
- ◆ Large City
- ▲ Hill
- ▲ Hospital
- ▲ Park
- US Highway

- Population Center
- Street, Road
- Hwy Ramp
- Major Street/Road
- Street, Road
- Interstate Highway
- State Route

- US Highway
- Railroad
- River
- Open Water

Diamond State Salvage Site

Mag 15.00

Thu Aug 17 08:53:21 1995

Scale 1:15,625 (at center)

1000 Feet

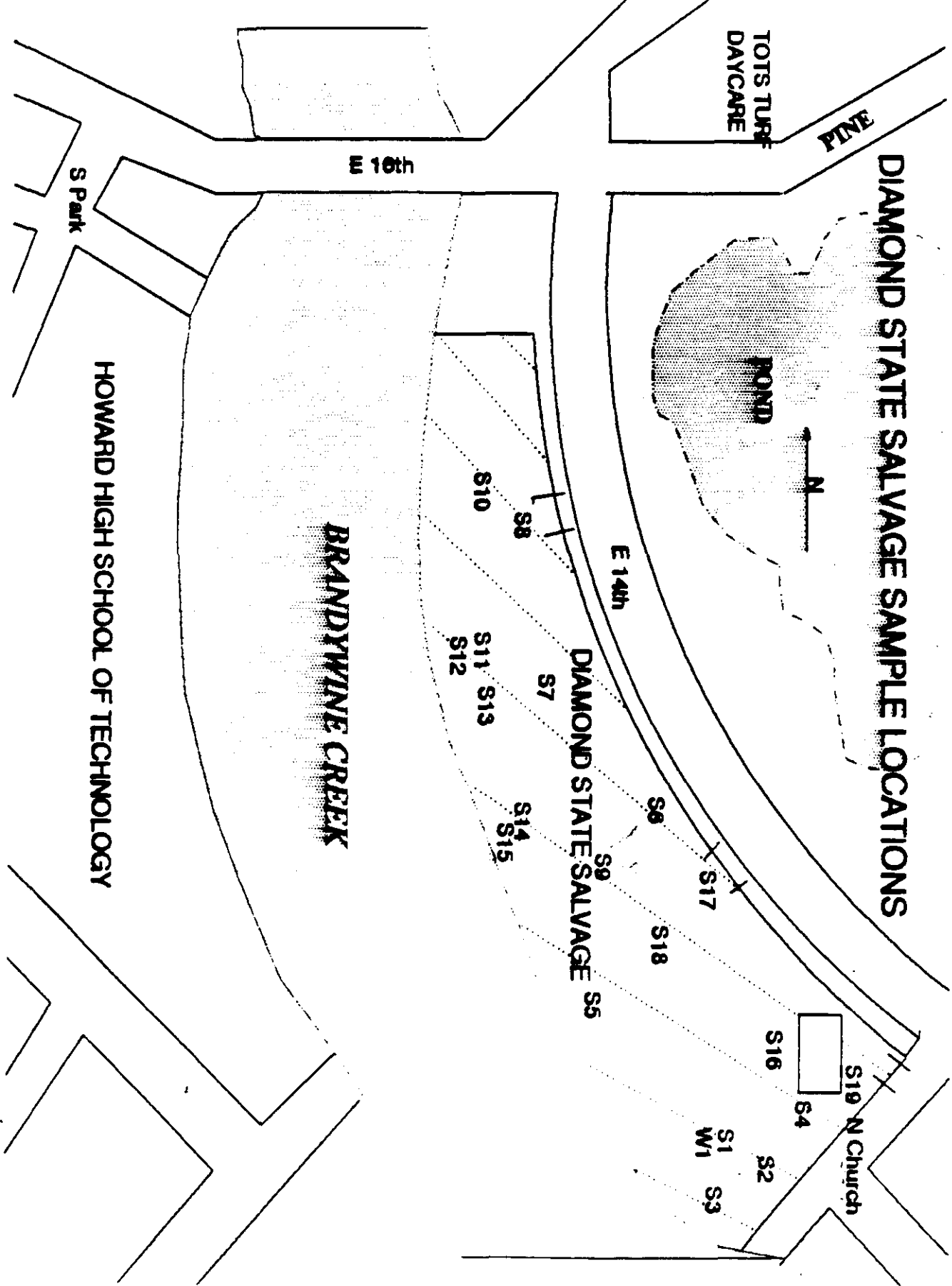
500 Meters

AR000036

Attachment 8: Site Sampling Map

AR000037

DIAMOND STATE SALVAGE SAMPLE LOCATIONS



AR0000038